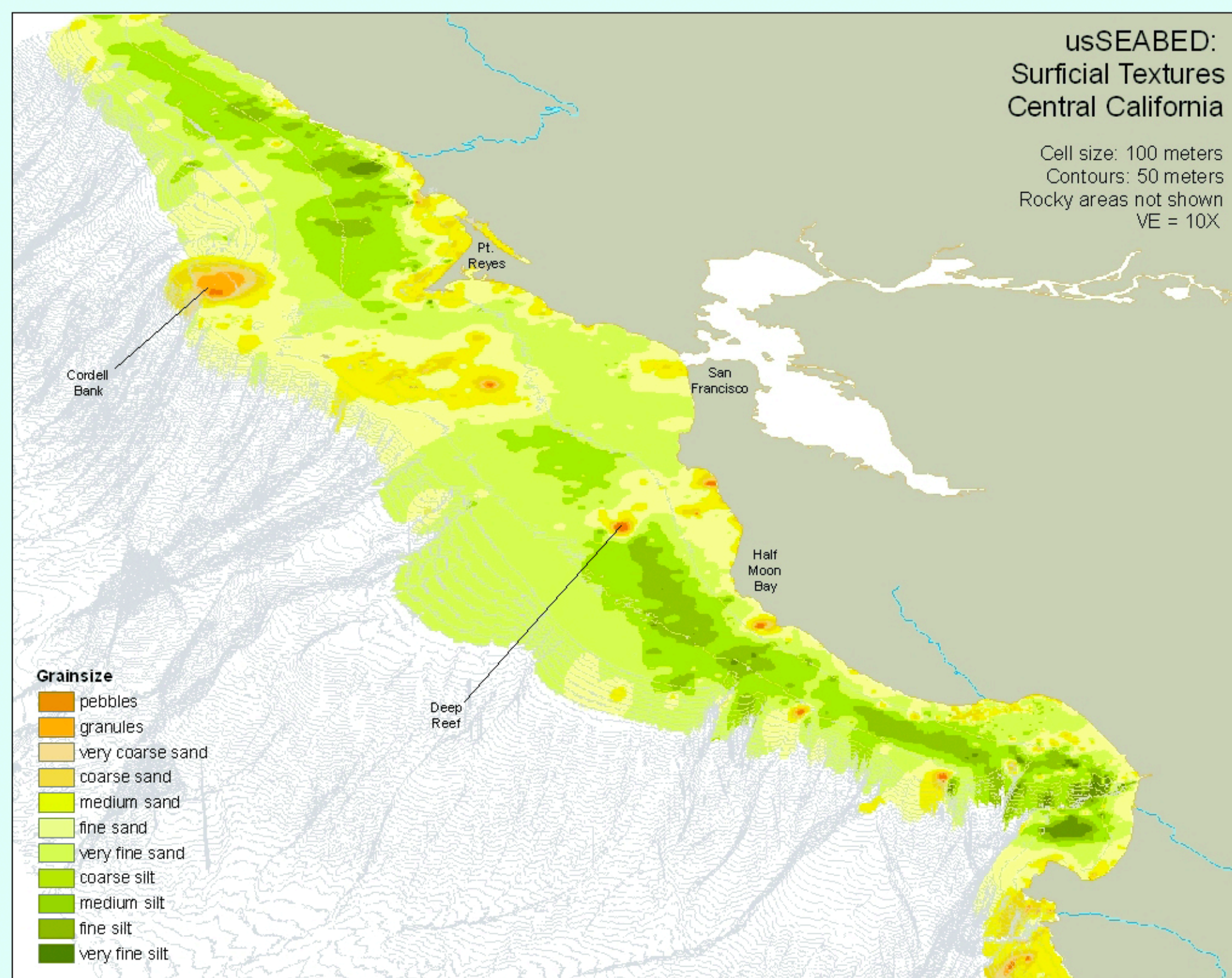
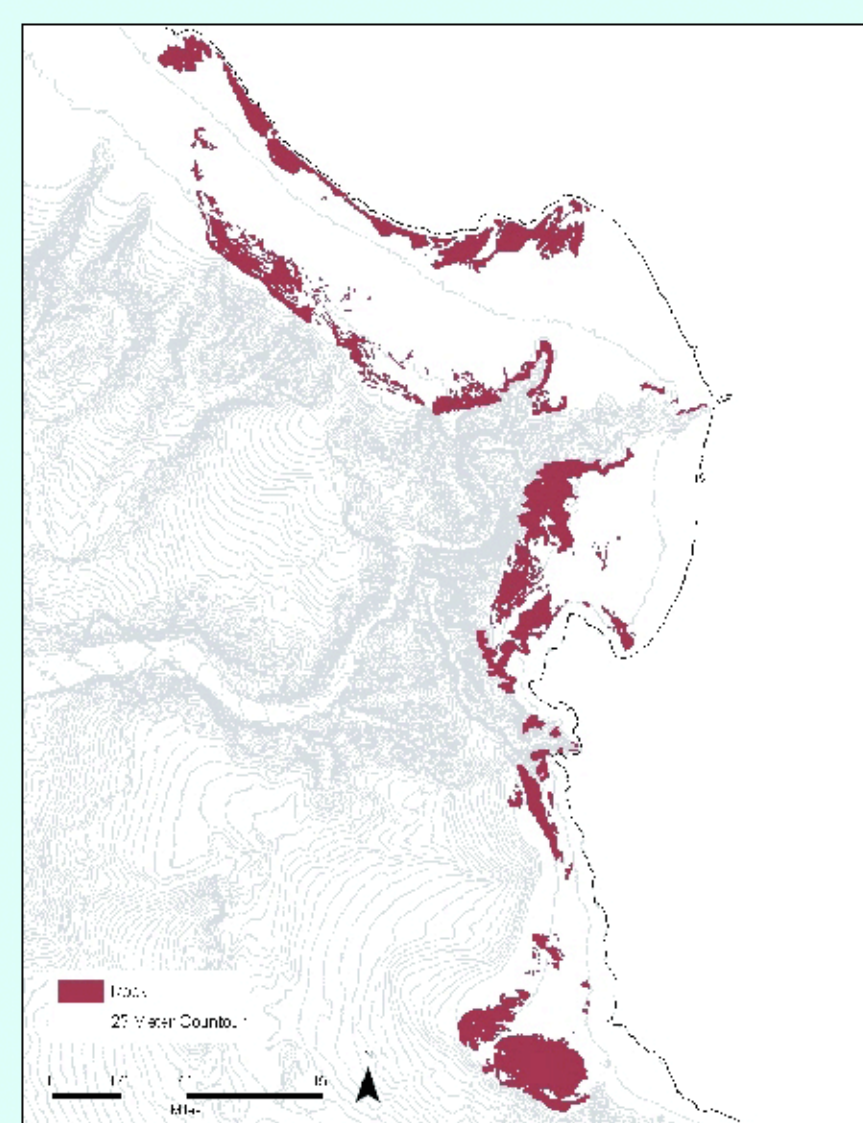
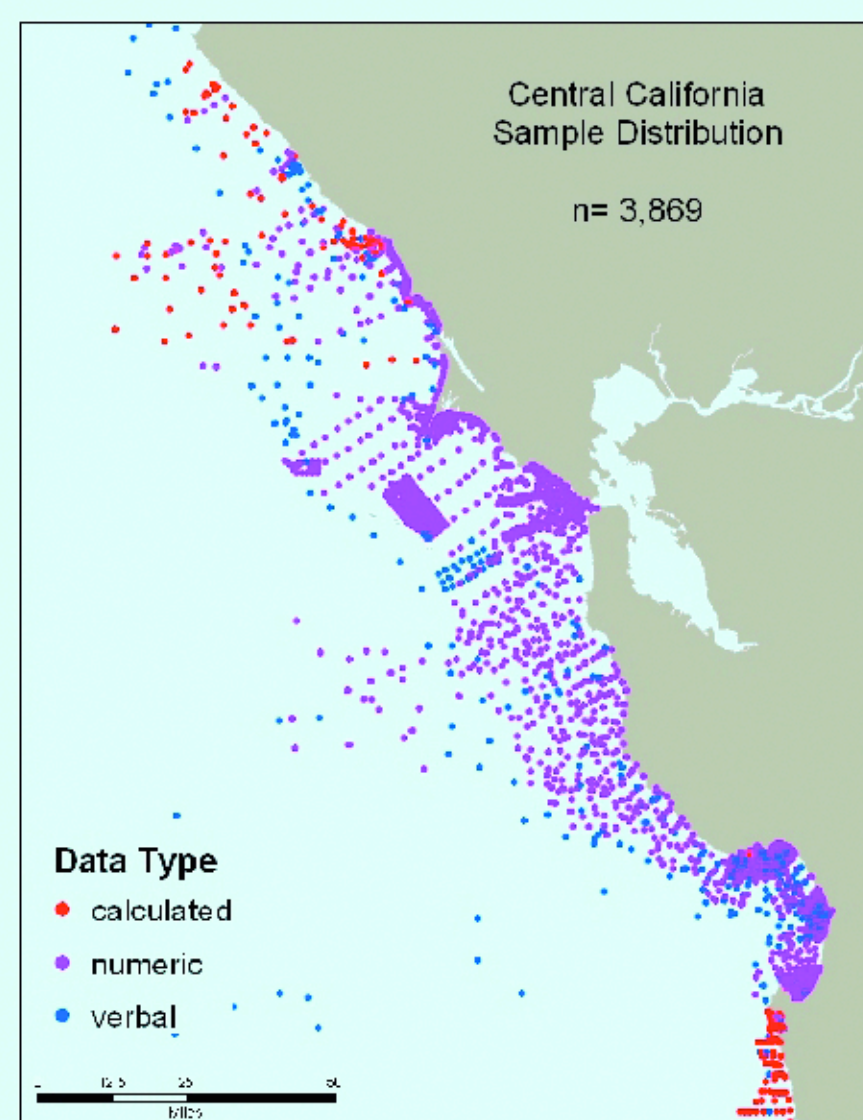


Sedimentary character of California's continental margin: Views from usSEABED



Central California

This draft image, which looks approximately northward from Monterey Bay in the south to Pt. Arena in the north, is gridded from 3,869 data points and is confined to the shelf above the 500 meter isobath (contour interval 10 meters). The data show that much of the shelf is covered in very fine sand (lightest green) with a series of shore-parallel mid-shelf “mud” belts composed of fine to coarse silt (darker greens) along much of the central California coast. Fine to medium sands (yellows) line the shore above the 60 meter isobath in the north and the 30 meter isobath in the south, with pockets of sands along the shelf edge. Oriented normal to the Golden Gate are large deposits of fine and medium sands crossing the shelf to the Farallon Islands. Notable gravel deposits and (or) areas of exposed bedrock are evident on Cordell Bank and on “Deep Reef” off Half Moon Bay.



Introduction

Continental shelf margins are dynamic sedimentary environments that contain vital benthic habitats and affect many human functions such as navigation, national defense, cables and pipelines, and fishing. The sediment in the nearshore may contain resources such as sand and gravel aggregates, valuable for beach nourishment to mitigate coastal erosion, enhance recreation and restore degraded coastal ecosystems, while the rocky areas may provide critical cover for Sebastes and other fishes.

Digital, GIS-based, geologic maps of the surficial character of continental margins are critical tools for better understanding of geologic history and processes, the distribution of habitats and resources, and for managing coastal-marine issues.

These draft images are created using data from usSEABED (<http://walrus.wr.usgs.gov/usseabed/>), the result of collaboration between the USGS, the University of Colorado, National Marine Fisheries, California Geological Survey, and other agencies throughout the U.S.

usSEABED is a national database of seabed characteristics constructed from datasets of seabed sample analyses and observations, filtered through the fuzzy logic software, dbSEABED. In California, usSEABED holds approximately 26,000 data points that are included in USGS Data Series 182 (online and available here on CD-ROM).

How the Images are generated:

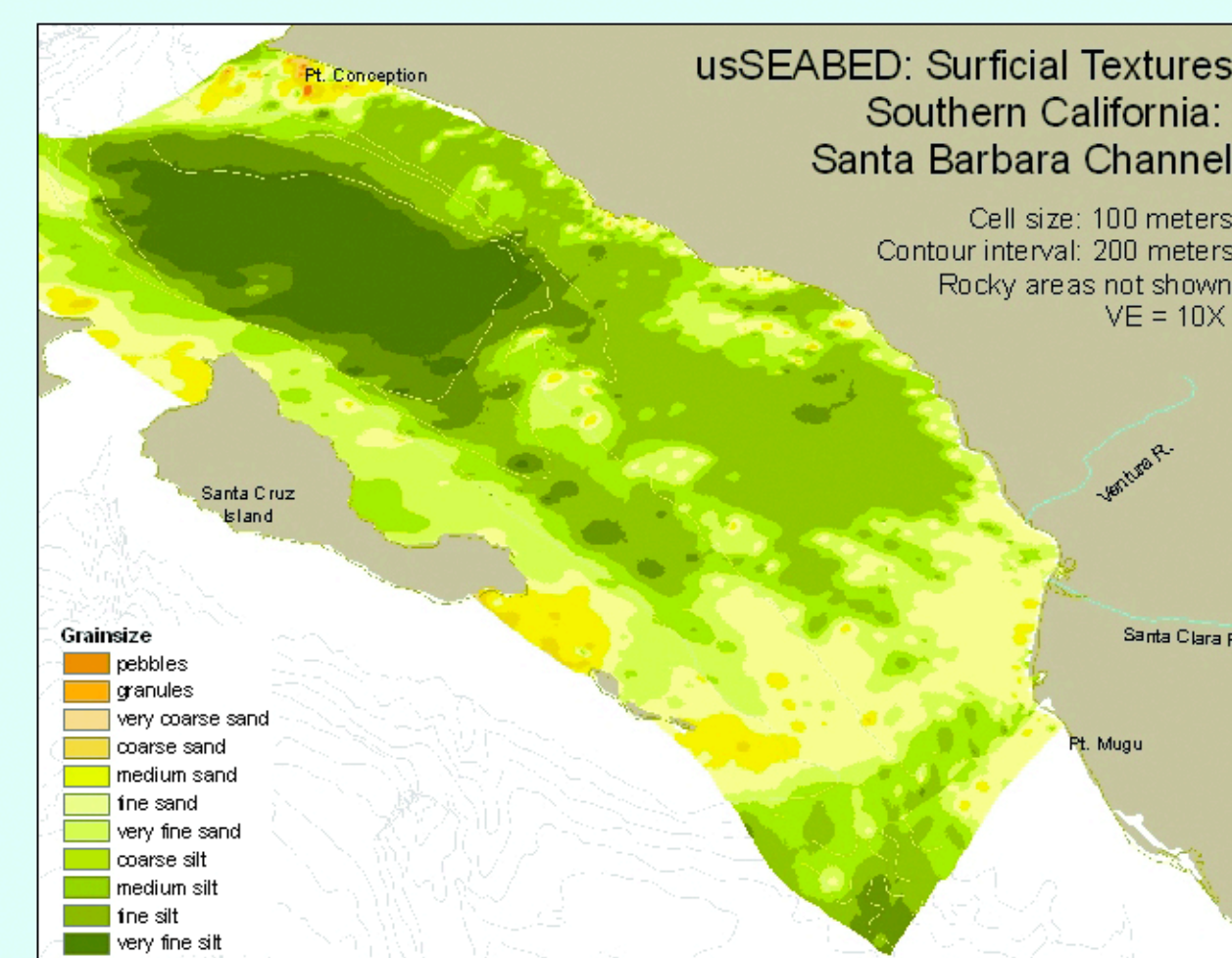
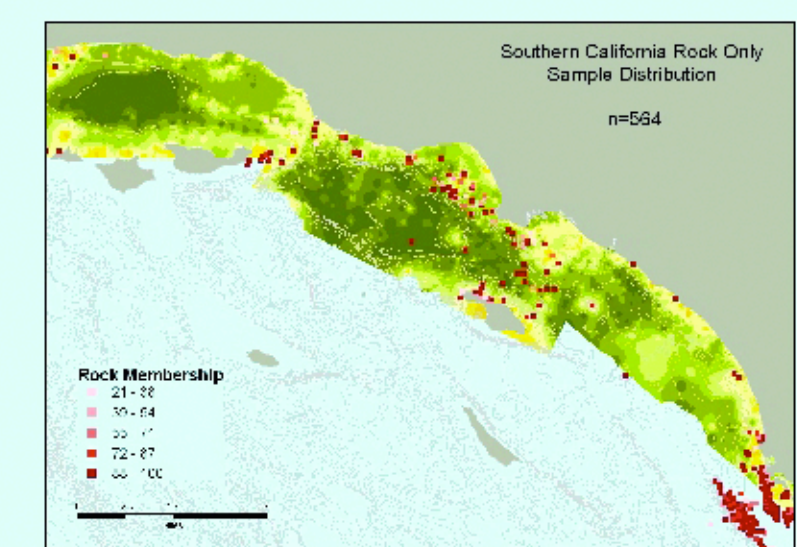
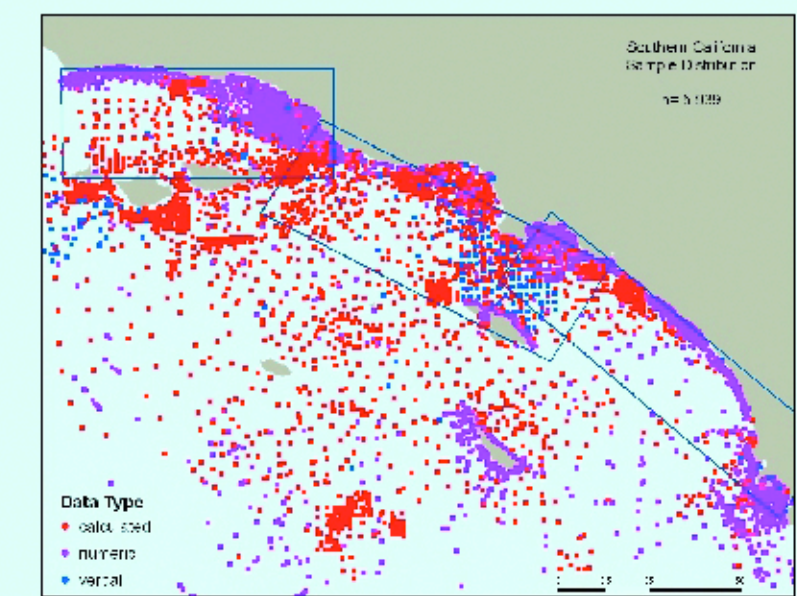
The textural images are based on physical samples (lab analyses and verbal descriptions of cores, grabs, and photos) from 127 different surveys dating from the late 1800s to 2002. The number of samples for each area is indicated in the sample distribution image. The descriptions and standardized numeric data are filtered through a data mining program based on fuzzy set theory, dbSEABED, (<http://instaar.colorado.edu/~jenkins/dbseabed/dbseabed.html>) from the University of Colorado, and are part of the USGS usSEABED database.

The grids of mean grain size are created in ArcMap and ArcScene above the 500 m isobath, derived using the inverse distance weighted (IDW) grid method, with a cell size of 100m and a variable radius of 12 sample points (nearest neighbor). This technique forces coverages in areas of sparse data.

An important consideration while viewing these images are that current gridding techniques do not use depth as a factor during the processing. Because depth is important during deposition, the sedimentation patterns on basin edges, top of the continental shelf, and canyon walls are poorly suggested in these grids.

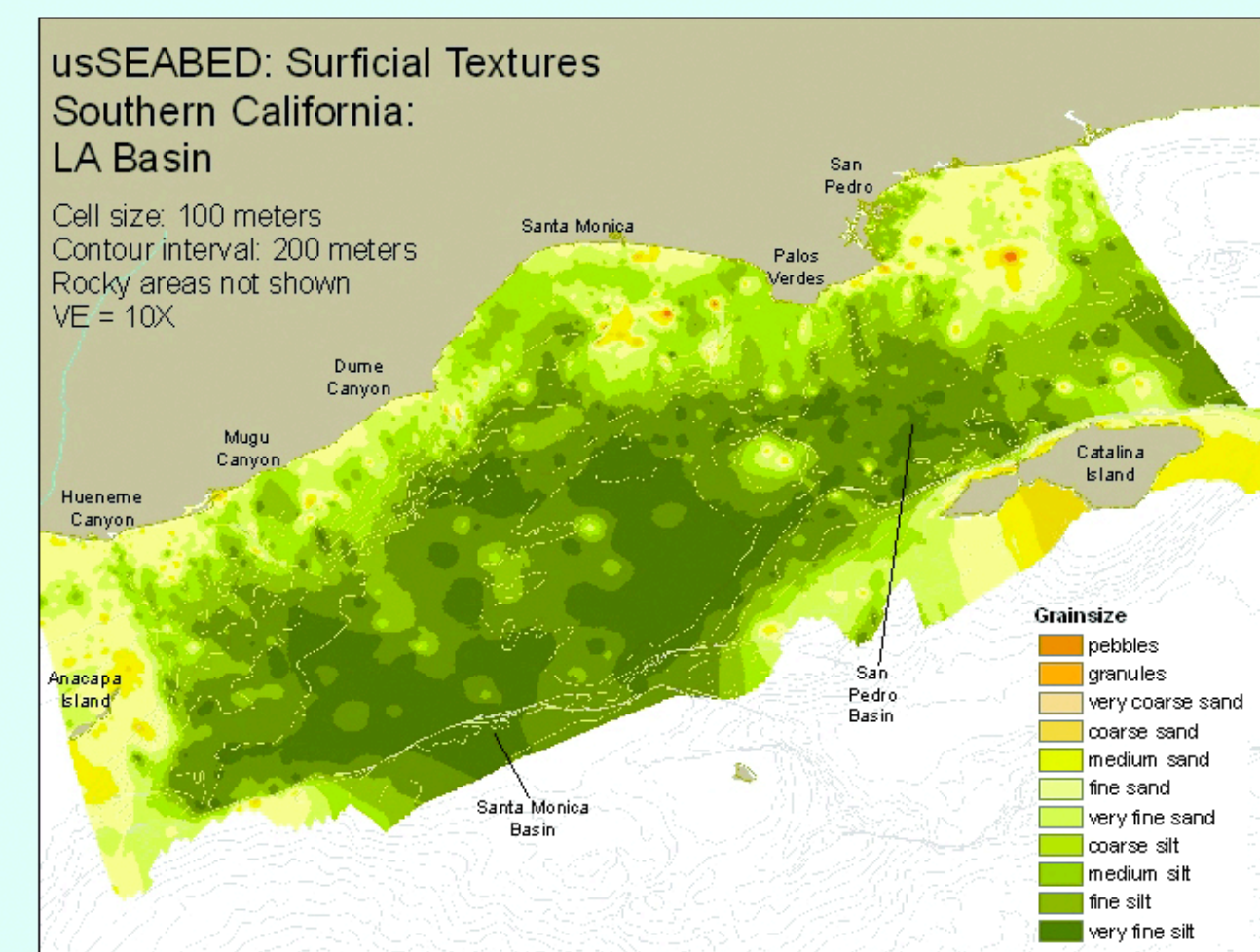
Southern California

These three draft images (Santa Barbara Channel area, Los Angeles margin, and the southern margin) are gridded from 5,939 data points from multiple data sources. Grid source data distribution (lab-based numeric, word-based numeric, and calculated) is shown at top; rectangles delineate areas of gridded images below. Some data with large navigational uncertainties were excluded from the source data set.



Santa Barbara Channel

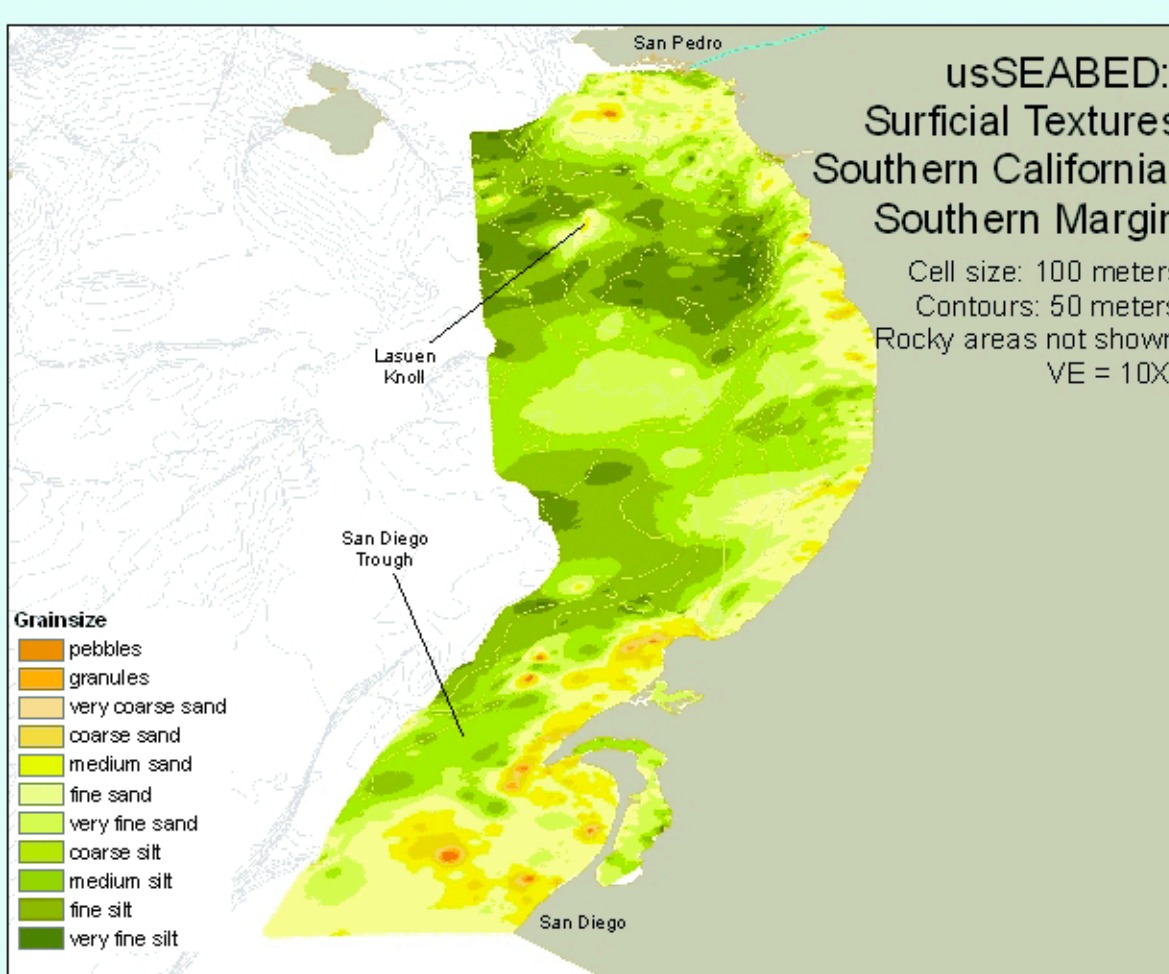
This image, looking approximately northwestward, covers the area between Pt. Conception in the north to Pt. Mugu in the south. The basin muds - mostly silts, in greens - dominate the image, where depths reach 400 meters and below (contour interval 100, starting at 200 m). The shelf is primarily covered in coarse silts (light greens), with pockets of medium to very fine sands (pale yellows) along the coast and lining the shelf edge in pockets. Just south of Pt. Conception, areas of gravel, coral, shells, and exposed rock are evident by the darker yellows and oranges. Large deposits of very fine to medium sands cover the shelf north of the Channel Islands. Particularly notable are the large areas of fine and very fine sands (pale yellows) creating a delta-like deposit off the Santa Clara and Ventura Rivers in the lower right.



Los Angeles margin

This draft image looks approximately SSE and covers the area between Point Mugu and Long Beach, looking from Catalina Island in the lower right across Santa Monica and northern San Pedro basins to the Santa Monica and San Pedro shelves. Anacapa Island can be seen at the leftmost portion of the image.

The northernmost continental shelf is primarily fine and very fine sands (pale yellows), cut by Hueneme Canyon (prominent at the north) in mud (greens), Magu and Dume canyons. Santa Monica shelf is covered primarily with coarse silts (pale green), although the rocky areas (oranges and reds) near the shelf edge off the southern portion of the bay are well represented. The effect of the harbor barriers on San Pedro shelf is obvious, with mud (green) behind the barriers, and fine and medium sands (yellows) outboard, extending northward along the western edge of the Palos Verdes peninsula. Pockets of stones (oranges) help delineate the shelf edge. Silts (green) fill Santa Monica basin to northern San Pedro basin, with coarser sediments atop the knoll in the center. Imagery on the west side of Catalina Island is an artifact of the grid and should be ignored.



Southern margin

This draft image looks about northward from San Diego (in lower right) to San Pedro Bay in the upper left. Shown are very fine to medium sands along the coast (pale yellows), fine to coarse sands (more saturated yellows) near San Diego, and silts (greens) in San Diego Trough, in the center of the image. Gravelly areas (oranges and reds) near San Diego may be local bathymetric highs on the continental shelf. Lasuen Knoll is a prominent high in San Diego Trough, and is covered in sand (yellows). A separate image above shows individual areas of hard bottom or rocky exposure in purple.

Cascadia

This draft image looks roughly northward along the Oregon-Washington coast from the Rogue River delta in the south to Cape Flattery and beyond in the north. The grid was created from 3,773 data points and is restricted to the shelf and slope above the 500 meter isobath.

In general, the coast is lined with a wide swath of very fine to medium sands for much of Oregon and southern Washington, and the shelf-edge sandy areas do not appear well developed. A series of quasi shore-parallel mid- to outer- shelf mud belts (in greens) are mostly near the shelf edge, broken by Hecata and other banks (see image left). Of particular note, are the lack of a large delta off the Columbia River, and the large deposits of coarse sand to gravel deposits (yellows and oranges) off the Hoh, Quinalt (shown), and Queets rivers west of the Olympics.

Point distribution of rocky or hard-bottom areas shown in figure at right.

